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Patent Docket: DCL1871/M4954 12/12/03 BDJ

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Re Application of:)
Karthik Ramaswami, et. al.)
) Group Art Unit: 1745
)
Serial No.: 09/829,710) Exr. Julian A. Mercado
)
)
Filed: April 10, 2001)
)
For: ZINC/AIR CELL)

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APPEAL BRIEF

This is an Appeal of the Final Rejection dated Sept. 30,
2003 of claims 13, 15-20, 23, 25, 26, 28-30, 32-40, and 48. A
check for \$330 to the Commissioner for Patents in payment of the
fee for filing the brief is enclosed. The brief is submitted in
triplicate. Please charge any additional charges required in
connection with the filing of this brief to Deposit Account
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REAL PARTY IN INTEREST

The subject patent application has been assigned to The Gillette Company, the party in interest.

RELATED APPEALS AND INTERFERENCES

There are no related appeals and interferences.

STATUS OF THE CLAIMS

Claims 13, 15-20, 23, 25, 26, 28-30, 32-40, and 48 stand rejected under 35 USC 103(a) as being unpatentable over Oltman et al. (U.S. Pat. 5,567,538) in view of JP 50-134137 hereinafter (JP '137) and Mansfield, Jr. et.al. (U.S. Pat. 5,306,580).

STATUS OF THE AMENDMENTS

All Amendments to the claims have been entered.

SUMMARY OF THE INVENTION

The anode casing of zinc/air cell is characteristically in the shape of a can having a closed end and opposing open end with side wall extending from the closed end and terminating in a peripheral edge. The anode casing of the zinc/air cell can be formed of a multiclاد metal, for example, a triclاد of stainless steel plated on the outside surface with nickel and on the inside surface with copper (nickel/stainless steel/copper). When the anode casing of a zinc/air alkaline cell is formed of such multiclاد or triclاد metal, the peripheral (tip) edge surface of the anode casing has exposed along its surface each of the individual different metals layers: e.g., nickel, stainless steel, and copper, in close proximity to each other. That is,

such different metal layers are exposed within the thickness of the anode casing peripheral (tip) edge surface, e.g. between about 0.001 inches and 0.015 inches (0.0254 mm and 0.38 mm). Thus, the thickness of each of the triclاد layers that may be exposed at the peripheral (tip) edge is very very small, namely between about 0.001 and 0.015 inches (1 and 15 mils) in thickness and even less. For example, as stated in the Application specification: The copper layer 166 desirably has a thickness between about 0.0002 inches (0.005 mm) and 0.002 inches (0.05 mm). The stainless steel typically has a thickness between about 0.001 inches (0.0254 mm) and 0.01 inches (0.254 mm) and the nickel layer between about 0.0001 inches (0.00254 mm) and 0.001 inches (0.0254 mm). The total wall thickness of the anode casing 160 composed of such multiclاد metal can be desirably between about 0.001 inches (0.0254 mm) and 0.015 inches (0.38 mm). (Specification, p. 19, lines 13-21.)

Surprisingly, it has been determined that although the surface exposure of such triclاد layers at the anode casing peripheral (tip) edge is indeed very very small, the close proximity of the exposed different metal layers at said peripheral edge surface produces electrochemical potential gradients which are sufficient to promote electrolyte creep and noticeably interfere with cell performance. Specifically, it has been determined that such potential gradient when exposed to any incoming air (oxygen) and aqueous alkaline electrolyte can cause secondary electrochemical reactions which in turn can promote electrolyte creep along the outside surface of the anode casing, that is, between the anode and insulating seal. Such electrolyte creep can occur due to the exposure of different metals at the anode casing peripheral edge surface, despite the presence of tightly placed insulating seal material between the anode and cathode casing. The secondary reactions which may be responsible for promoting such electrolyte creep owing to the exposure of the triclاد metals at the anode casing peripheral edge is postulated in the Application specification at p. 17 and 18.

Such electrolyte creep can gradually deplete electrolyte, interfere with proper cell performance, and also cause damage to electronic devices, e.g. hearing aids, being powered.

It has been determined that when the exposed different metals, e.g. the exposed different triclاد metals, at the anode casing's peripheral (tip) edge surface are covered with a homogeneous protective metal coating, preferably of tin or copper, there is no potential gradient across the anode casing peripheral (tip) edge surface. Thus, the secondary reactions resulting from exposure to different metals at the anode casing peripheral edge surface is eliminated and electrolyte creep resulting directly from such secondary reactions is also eliminated.

Applicant has carefully presented data in the present Application Tables 1 and 2 showing the marked reduction in electrolyte leakage resulting from cells with anode casing plated to cover the exposed nickel/stainless steel/copper layers at the peripheral edge surface. In specific examples these different exposed triclاد layers were covered with a protective metal of tin or copper. The reduction in electrolyte leakage resulting from such covering of the exposed triclاد layers was very significant. For example, inspection of Table 1 reveals that at the end of 12 months there was noticeable electrolyte leakage in 96.9% of the mercury free comparative zinc/air cells (Group B) having anode casings of untreated nickel/stainless steel/copper triclاد. By contrast only 0.3% of the Group E cells and 0.2% of the Group H cells showed leakage at the end of the 12 month period. The Group E cells had anode casing of triclاد nickel/stainless steel/copper overcoated with a layer of tin to cover the exposed different triclاد metals. The Group H cells had an anode casing of triclاد nickel/stainless steel/copper overcoated with a layer of copper to cover the exposed different triclاد metals.

The cell with which Appellant is concerned is a very particular type of cell. Appellant's cell as described in the specific embodiments and as defined in the claims is a zinc/air cell characterized by having an anode casing (anode can), a cathode casing (cathode can), anode material comprising zinc particles and alkaline electrolyte within the anode casing, and a catalytic cathode within the cathode casing. Appellant's position is that it has not heretofore been recognized that exposure of triclاد metals at the peripheral (tip) edge of the anode can of such zinc/air cell can promote any significant electrolyte leakage or otherwise noticeably interfere with cell performance. As above mentioned, such exposure of the triclاد metals at the anode casing peripheral edge would be very, very small, e.g. between about 0.001 and 0.015 inches and even less in thickness, and thus at such small values would not be expected to cause any noticeable problems.

Appellant acknowledges that zinc/air cell anode cans composed of triclاد metals nickel/stainless steel/copper is reported in the literature. Zinc/air cell art also reveals that such anode cans can be plated on their inside body surface over the copper layer with another metal, for example indium, to improve conductivity. But such zinc/air cell art does not disclose any concern with also plating the peripheral (tip) edge of the anode can to cover exposure of each of the triclاد metals on such surface.

Mansfield (U.S. 5,306,580), which the Examiner applies against Appellant's claims herein, is illustrative of a zinc/air cell having an anode can of triclاد metal, namely, nickel/stainless steel/copper. Mansfield discloses employing a layer of indium 34 plated over the copper layer 33 (inside surface facing the anode material) of the triclاد anode can. Interestingly, the use of the indium plate as described in Mansfield is to lower cell impedance (improve conductivity) in mercury free zinc/air cells. (Mansfield, col. 7, lines 3-10) The

lowered impedance results in increase in useful service life compared to same mercury free zinc/air cells with no indium plate. (Mansfield, col. 6, lines 41-46). Importantly, Mansfield is not concerned with the problem specifically of retarding electrolyte creep between the anode can and seal. Furthermore, it is clearly apparent from his figure that Mansfield is not concerned with also plating the peripheral tip edge of the anode can with indium (or any other metal) to prevent exposure of the triclاد metals at such edge surface. In fact Mansfield's figure clearly shows that each of the triclاد metals are indeed left exposed at the anode can peripheral edge even after the indium plating 34 is applied over the copper layer 33 (inside surface) of the anode can.

STATEMENT OF THE ISSUES PRESENTED

Whether claims 13, 15-20, 23, 25, 26, 28-30, 32-40 and claim 48 are patentable under 35 USC 103 over Oltman (U.S. Pat. 5,567,538) in view of JP 50-134137 (hereinafter JP '137) and Mansfield, Jr. (U.S. Pat. 5,306580).

GROUPING OF THE CLAIMS

The independent claims are claims 13 and 48. Claims 13 and 15-20, 23, 25, 26, 28-30, and 32-40 are grouped together with respect to the rejection under 35 USC 103. Patentability of claim 30 is argued separately. Claim 48 stands separately with respect to the rejection under 35 USC 103.

ARGUMENT

I. Argument Against the Reference Oltman (U.S. 5,567,538) and JP 50134137 (JP'137).

Oltman discloses a zinc/air button cell having an anode can 24, cathode can 44 with at least one air hole 54 in its bottom end 46. The cathode can has a circumferential upstanding side wall 47 emanating from the bottom end 46. A cathode assembly 42 comprising cathode 40 is positioned adjacent the bottom end 46 of the cathode can. The anode can 24 has a top closed end 28, and opposing open end with circumferential downwardly-depending side wall 30 emanating from top end 28. The circumferential side wall terminates in a circumferential can foot 36 which forms the distal (peripheral) edge of the anode can. Anode material 26 comprising zinc (recognizable in the art as typically comprising a mixture of zinc and alkaline electrolyte) is inserted into anode can 24. The anode and cathode cans are joined together by locking the side wall 30 of the anode can over the side wall 47 of the cathode can with seal 60 of electrically insulating material therebetween. As the Examiner points out Oltman recites an anode can having a wall thickness of between about 0.114 mm (4.49 mil) and 0.145 mm (5.71 mil) at col. 4, lines 28-30. The seal 60 thickness between anode and cathode cans may be between about 0.100 and 0.150 mm. Specific cells may typically have a diameter between about 6.4 to 25 mm and height between about 2.1 and 15 mm (col. 1, lines 30-34).

It is recognized in the art that a typical anode reaction for such a zinc/air cell of the type depicted in Oltman is: $\text{Zn} = \text{Zn}^{2+} + 2\text{e}$ followed by $\text{Zn}^{2+} + 2\text{OH}^- = \text{ZnO} + \text{H}_2\text{O}$. A typical cathode reaction for such cell is $\frac{1}{2}\text{O}_2 + \text{H}_2\text{O} + 2\text{e} = 2\text{OH}^-$. In such

case the overall electrochemical reaction is: $\text{Zn} + \frac{1}{2}\text{O}_2 = \text{ZnO}$. Thus zinc oxide is gradually formed in the anode and there is no net consumption of water. Although the metal/air cell referenced in Oltman is not necessarily limited to a zinc/air cell having the exact electrochemical reactions as given above, such reactions are typical.

As the Examiner correctly points out Oltman's anode can is of stainless steel comprising an inner surface 32 plated with copper and an outer surface 34 plated with nickel, thereby resulting in a triclاد of metal. (See, e.g., col. 22, lines 1-8). As the Examiner indicates the anode can (side wall) has an edge (foot 36) which, at the distal end thereof, will have an exposed portion. The implication is that a portion of each of the triclاد metals (nickel, stainless steel and copper) will be exposed at the very distal end (foot 36) of the anode can edge.

The Examiner agrees that Oltman does not contemplate plating the exposed distal edge (foot 36) of the anode can to cover the three exposed metals. In fact Oltman is not concerned with plating any additional metals onto the surface of the triclاد anode can. Thus, in Oltman's disclosure each of the different triclاد metals at the tip edge of the anode cup, would remain exposed within the cell, since Oltman is not concerned with providing any protection for the peripheral edge surface of the anode can. Specifically, the Examiner states:

"Oltman does not explicitly teach a metal coating over the anode cup surfaces and end edge surface portions." (Final Action, p. 4, lines 3-4.)

However, the Examiner relies on the disclosure of JP '137 to supply the information missing in Oltman, namely, the plating

of the anode can exposed peripheral (tip) edge portion. JP '137 discloses a button alkaline cell having an HgO/graphite cathode with KOH electrolyte. (A full translation of JP'137 is provided in the Supplemental Information Disclosure submitted herewith.) In JP'137 the cell has an anode cup and a cathode cup with the anode cup inserted into the cathode cup. There is a Neoprene rubber alkali resistant insulator seal placed between the anode and cathode cups. The anode cup is composed of a multilayered metal, namely, nickel plated steel. The rim part (edge of the anode cup including the peripheral tip edge) is coated with a layer of Ni oxide film which was applied by electrolytic oxidation. The figure shows that the nickel oxide film is applied to both the outside surface and inside surface of the rim edge part of the anode cup at the open end thereof. The figure shows that the Ni oxide coating also covers the peripheral edge (exposed tip surface) of the anode cup. Thus the Ni oxide would cover any exposed nickel and steel layers at the anode cup's peripheral edge surface. The Nickel oxide coating on the anode cup's rim edge is said to prevent electrolyte leakage from the cell. Specifically, the Examiner states:

"However, as discussed in the prior Office Action JP '137 teaches coating anode cups, both at its inner and outer surfaces along with its exposed edge surfaces with a metal coating. '[T]he rim part of the Ni-plated anode sealing plate, which attaches to the insulator packing of the plate, is coated with Ni oxides' (Abstract) Thus, the skilled artisan would find obvious to modify Oltman by employing a metal coating over the anode cup and edge surface portions thereof for reasons such as prevention of electrolyte leakage." (Final Action, page 4, lines 4-9.)

Appellant agrees that Oltman discloses a triclاد material for the anode can of a zinc/air cell as in Appellant's anode can (stainless steel plated on the outside with nickel and on the inside with copper.) Such triclاد material is commonly in use in

connection with zinc/air cell cans. However, Oltman, clearly does not contemplate any benefit to plating the exposed portions of the triclاد at the exposed edge of the anode can. The Japanese patent JP '137 does not show any exposed triclاد material at the edge of the anode can because the rim edge was plated with Nickel oxide. However, JP '137 relates to a different type of battery, namely, button alkaline cell having an HgO/graphite cathode with KOH electrolyte.

II. Argument Against the Reference Mansfield (U.S. 5,306,580)

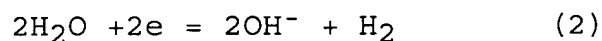
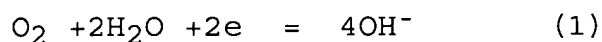
Mansfield (U.S. 5,306,580) discloses a zinc/air alkaline button cell wherein the anode can is of a triclاد material, namely, steel with a layer of nickel on its outer surface and a layer of copper on its inside surface. There is a plastic insulating seal around the anode can. The anode can is filled and inserted into the cathode can so that the insulating material lies therebetween. There is also a layer of indium over the copper layer so that the indium covers the inside surface portion of the anode can in contact with anode active material within the can. The edge of the anode can at the open end thereof is folded outwardly so that a portion of the outside surface of the anode can, that is, the portion abutting the plastic insulating seal has a portion of the indium layer facing and abutting the seal. Mansfield indicates that the triclاد material for the anode cup works well for miniature cells with added mercury to the anode, but that increased gassing can be expected in such cells that are mercury free. (col. 2, lines 2-10). Increased gassing can of course reduce the useful service life of the cell. Mansfield indicates that the indium plating on the copper helps to extend service of mercury free cells. (col. 6, lines 42-46).

However, it is interesting to note that none of Mansfield's figures show indium at the exposed peripheral edge surface of the anode can. Thus, in Mansfield's disclosure each of the different triclاد metals comprising the anode cup remain exposed to alkaline electrolyte within the cell, since Mansfield is not concerned with providing any protection for the peripheral edge surface of the anode can. Specifically, there is no indication that Mansfield contemplates applying an indium coating (or any other protective coating) to such peripheral edge surface to cover the exposed triclاد metals. Mansfield does not consider that there can be any meaningful adverse effect of having the triclاد metals exposed to electrolyte at such peripheral edge surface of the anode can.

III. (a) The Problem of Electrolyte Creep in the Zinc/Air Cell Has Been Determined to Be Exacerbated by the Inflow of Oxygen to the Cell Which Reacts With Water to Produce Hydroxyl Ions and Hydrogen Gas

(b) The Exposure of Triclاد Metals At the Peripheral (Tip) Edge of the Anode Can Has Been Determined to Contribute to the Problem of Electrolyte Leakage.

Appellant has provided a mechanism for the electrolyte creep problem in zinc/air cells. The problem is exacerbated by the inflow of air to the cell and the exposure of the triclاد metals at the peripheral (tip) edge of the anode casing. The mechanism for the electrolyte creep problem is shown promoted by the inflow of air to the cell according to the following equations given in the Application specification at p. 18, Equations 1 and 2.



As discussed in the Application at p. 18, the oxygen input to the zinc/air cell along with the water in the electrolyte react as in the above reactions to produce additional hydroxyl ions and hydrogen gas. The increase in hydroxyl ions and hydrogen which eventually can reach the peripheral edge surface of the anode can of a zinc/air cell is believed to promote electrolyte creep and leakage. The reactions are catalyzed during cell discharge by the potential gradient caused when the triclاد metals are exposed at the surface of the peripheral (tip) edge of the zinc/air cell anode can. The production of hydroxyl ions and hydrogen gas at the side of exposed triclاد metals (anode can peripheral edge) creates a local high concentration of hydroxyl ions at or near such site. The high concentration of hydroxyl ions is pressurized by the formation of hydrogen gas resulting from the above reaction (2). Such local concentration of hydroxyl ions and local increase in hydrogen tend to cause hydroxyl ions and water (electrolyte) to creep into microscopic crevices between the anode can and adjoining seal, particularly along the outside surface of the anode can. Appellant has determined that a solution to the problem resides in plating the peripheral (tip) edge of the anode casing of the zinc/air cell with a plated with at least one layer of a protective metal, preferably comprising tin or copper, thereby covering and preventing exposure of said different metals at said peripheral edge surface and thus reducing the rate of any reactions (1) and (2).

IV. The Reference JP 50134137 Does Not Relate to A Zinc/Air Cell and Therefore Does Not Contemplate Appellant's Problem of Electrolyte Creep Which Is Promoted by the Inflow of Air (Oxygen) to the Cell.

JP '137 relates to an alkaline zinc/HgO cell. The specific embodiment and example is with respect to a zinc/HgO cell. Application to other zinc alkaline cells, namely an alkaline Zn/MnO₂ cell or nickel-zinc battery is mentioned only in passing. There is no mention or concern in JP '137 with zinc/air cells or the problem of leakage of electrolyte promoted by the inflow of air (oxygen) to the cell. JP '137 shows an anode can of a multicladd nickel plated steel sheet. The inside and outside surfaces of the anode can adjacent the insulating seal and also the peripheral (tip) edge of such can is shown plated with nickel oxide. The nickel oxide treatment creates an irregular surface and improves adhesion between the anode can walls and the insulating seal of said HgO cell and thus is said to prevent electrolyte leakage. The impression in JP'137 is that the plating of the peripheral (tip) edge with nickel oxide is only an incidental part of the nickel oxide plating applied to major portions of inside and outside surfaces of the anode can shown in the figure. There is certainly no concern, teaching or criticality expressed directed to plating the peripheral (tip) edge of the anode can to cover any exposed multicladd layers to reduce the rate of unwanted reactions at such site in the context of a zinc/air cell.

The fact remains that JP'137 deals with a different type of cell, namely a Zinc/HgO cell. One would not look to Jp'137 to solve a leakage problem in a zinc/air cell promoted by the inflow of air to the cell when the cell in JP'137 is a different type of cell, not at all involving air input.

**V. Appellant's Claims Are Patentable Under 35 USC 103(a)
Over Oltman (U.S. 5,567,538) In View Of JP 50-134137 and
Mansfield (U.S. 5,306,580)**

The Examiner's position in sum is that Oltman shows a zinc/air cell with anode cup formed of a triclاد metal comprising stainless steel plated on the outside surface with a layer of nickel and on the inside surface with a layer of copper. Appellant's anode cup as recited in independent claims 13 and 48 is also of such triclاد metal. The Examiner admits that Oltman does not disclose covering the peripheral edge surface of the anode cup with any additional metal in order to cover each of the triclاد metals which may be exposed at the peripheral (tip) edge surface of the anode can. In fact Oltman is not concerned with plating any of the triclاد metal surfaces of the anode can with any additional metal layer. The Examiner points to JP '137 to supply the missing information, namely to show plating of the peripheral (tip) edge surface of an anode can with an additional metal, wherein the anode can is originally formed of a multiclاد metal. Specifically, JP '137 discloses an anode can formed of a multiclاد metal comprising steel plated with nickel. The figure in JP'137 shows that the inside surface and outside surface of the anode can along with the peripheral (tip) edge of said anode can is additionally plated with nickel oxide. The teaching in JP '137 is that such plating with nickel oxide prevents electrolyte leakage. The cell with which JP'137 is concerned, however, is not a zinc/air cell, but rather a zinc/HgO alkaline cell.

The nickel oxide layer in JP'137 improves adhesion between the anode can wall and adjacent insulating seal thereby reducing the chance of electrolyte leakage. There are no other mechanisms postulated in JP'137. And the reference is certainly not concerned with Appellant's zinc/air cell or the leakage problem therein, which is promoted by the inflow of air to the cell.

The Examiner applies Mansfield (U.S. (5,306,580)). Mansfield shows an anode can for a zinc/air cell, wherein the anode can is formed of a triclاد metal comprising stainless steel plated on the outside surface with nickel and on the inside surface with copper. Mansfield is focused on plating the inside surface with an additional layer, namely of indium. There is no disclosure or teaching in Mansfield for covering the peripheral (tip) edge of the anode can with indium or any other metal in order to prevent exposure of each of the triclاد metals at said peripheral edge. The Examiner interprets Mansfield as teaching the mutual equivalence of protective layers such as copper or tin along with nickel as a protective layer to resist passivation and/or attack by electrolyte. The Examiner indicates that Mansfield states: "copper is the preferred material to use as an underlayer," "the surface of the substrate located opposite the underlayer is commonly coated with a metal such as nickel or tin, "this underlayer resists passivation and/or attack by the cell's electrolyte." (Mansfield, col. 4, line 24-25, line 26-27, and line 21-22, respectively.) The Examiner also quotes Mansfield: "The preferred material for use as the overlayer is nickel because of its bright appearance and adequate corrosion resistance" (Mansfield, col. 4, line 31-33).

Appellant has determined that tin is a preferred metal in which to coat the peripheral (tip) edge surface of the anode can of a zinc/air cell to cover triclاد metals which would otherwise be exposed at said edge. This has been determined to help reduce the chance of electrolyte leakage from the cell. This is reflected in Appellant's main claim 13. Another preferred metal for coating said peripheral edge of the anode can is copper to cover said triclاد metals which would otherwise be exposed at said peripheral edge. Appellant does not agree that nickel oxide as disclosed in JP'137 is necessarily an equivalent coating material for the same purpose. Mansfield is focusing on the use of tin or copper coating to prevent surface corrosion, not the same problem as Appellant's. And Mansfield does not disclose any

application of copper, tin or any other metal to the peripheral (tip) edge surface of the anode can, which is Appellant's invention. It should be appreciated that the nickel oxide disclosed in JP'137 is used to improve the adhesion between the anode can wall and adjacent insulating packing seal of the HgO cell. Appellant's problem is different. Appellant has determined that exposure of such triclاد metals at the anode can peripheral edge catalyzes reactions (1) and (2) above, specific to a zinc/air cell. Appellant thus is concerned with reducing the rate of such reactions (1) and (2), which are dependent on input of air (oxygen) to the zinc/air cell.

In any event the main issue to be considered is not that of equivalence of tin, copper, and nickel oxide as a coating material for anode cans, which is the Examiner's principal focus, but rather the main issue should be:

whether any of the cited references alone or combination discloses or suggests the coating of the peripheral (tip) edge surface of the anode can of a zinc/air cell to cover portions of multiclاد metals, which would otherwise be exposed at said edge surface.

Different types of cells can respond differently to different can coating metals with respect to coating effect on anode conductivity, cell performance, gassing, electrolyte seepage, etc. Thus, the relevant inquiry should be what the reference (or combination of references) teaches or suggests with respect to a zinc/air cell, not some other cell. There is no mention of JP'137 in connection with a zinc/air cell. There is no theory or mechanism propounded or inferable from JP'137 as to why the nickel oxide coating on the anode can surfaces (including the peripheral edge surface) of the HgO cell prevents electrolyte leakage, other than due to improving the adhesion between the anode can wall and adjacent insulating packing seal. The modification required to JP'137 whether viewed alone, or in

combination with Oltman or Mansfield would require portions of Appellant's own disclosure in order to bridge the gap and supply the missing information. Such hindsight analysis is inapplicable. See, e.g. Grain Processing Corp. v. American Maize-Products Co., 5 USPQ2d 1788, 1792 (Fed. Cir. 1988).

Thus, the Examiner's assertion that armed with the teaching in Mansfield one skilled in the art could substitute the nickel oxide layer disclosed in JP'137 with tin or copper thus rendering unpatentable Appellant's independent claim 13 and 48, respectively, obscures the real issue: Namely, do any of the references alone or in any combination disclose or suggest the coating of the peripheral edge surface of the anode can of a zinc/air cell to cover portions of multicladd metals, which would otherwise be exposed at said edge surface?

The combination of references Oltman (U.S. 5,567,538) in view of JP 50-134137 and Mansfield (U.S. 5,306,580) does not render unpatentable Appellant's independent claims 13 and 48. The fact that there may be bits and pieces of structure in Oltman ('538), JP '137, or Mansfield '580 that disclose specific features of Appellant's claimed combination does not make Appellant's claimed combination obvious unless the art also contains something to suggest the desirability of the combination. See, e.g., In re Imperato, 179 USPQ 730 (CCPA 1973). The Court has consistently held that under section 103 teachings of references can be combined only if there is some suggestion or incentive to do so. (Emphasis the Court's.) ACS Hospital Systems, Inc. v. Montefiore Hospital, 221 USPQ 929 at 933 (CAFC 1984). See, also, In re Laskowski, 10 USPQ2d 1398 (Fed. Cir. 1989), the Court stating:

Although the Commissioner suggests that Hoffman could readily be modified to form the Laskowski structure, "the mere fact that the prior art could be so modified would not have made the modification obvious unless

the prior art suggested the desirability of the modification"

....the prior art does not suggest Laskowski's modification of the Hoffman band saw wheel, or provide any reason or motivation to make that modification.

JP' 137 does not deal with a zinc/air cell and accordingly does not contemplate a solution to Appellant's problem of electrolyte leakage which is promoted by input of air (oxygen) to the cell. JP' 137 does not recognize any particular benefit of covering exposed multicladd layer at the peripheral (tip) edge of the anode can of a zinc/air cell, that is, a cell wherein input of air is a significant factor in promoting leakage of electrolyte.

The reference JP '137 does not deal with a zinc/air cell and therefore does not contemplate Appellant's problem stemming from reaction of incoming oxygen with water, which reaction is catalyzed by the potential gradient caused by exposure of different tricladd metals at the anode can peripheral (tip) edge. Since, JP'137 does not recognize Appellant's problem, it cannot be said to suggest a solution. In the absence of at least specific mention of a zinc/air cell or the problem concerning unwanted reaction of oxygen and water promoting electrolyte leakage, JP' 137 is inadequate as a reference. Specifically, JP'137 is inadequate and deficient in supplying the missing information in Mansfield and Oltman in order to arrive at Appellant's invention. A person of ordinary skill in the art would not be able to supply the missing information in Oltman or Mansfield by turning to JP'137, without the benefit of also having Appellant's disclosure before him in order to arrive at Appellant's claims 13 and 48. Such hindsight analysis, as above stated, is inapplicable.

Accordingly, the rejection of the independent claims 13 and 48 under 35 USC 103 in view of the combination of references Oltman, JP'137 and Mansfield is believed traversed. Allowance of

the independent claims 13 and 48 on Appeal is respectfully requested.

Patentability of claim 30 relating to the very small wall thickness of the anode can between about 0.001 inches (0.0254 mm) and 0.015 inches ((0.38 mm) is specifically argued. None of the cited references show such range in combination with the remaining elements recited in claim 13. The very small wall thickness of the anode can recited in claim 30 also reflects the very small thickness of any triclاد materials which would be exposed at the anode can peripheral (tip) edge surface. Such exposed multiclاد layers at the peripheral edge surface are overlapped to eliminate their exposure in accordance with the invention as recited in independent claim 13, from which claim 30 depends. Thus, claim 30 is believed to be specifically patentable.

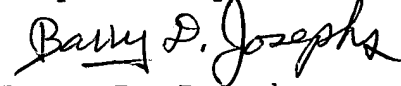
The remaining dependent claims reflect specific embodiments and specific additional features of the invention further restricting claim 13. Such dependent claims should thus be allowed if the main claim 13 is allowed.

Appellant respectfully requests the Board's favorable consideration of the arguments presented herein and allowance of the claims on Appeal.

Date: Dec. 12, 2003

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Respectfully submitted,


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Reg. No. 27,140
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APPENDIX

The claims involved in this appeal are set forth as follows:

13. A zinc/air depolarized cell comprising an anode casing and a cathode casing, an anode material comprising zinc particles and alkaline electrolyte within said anode casing, and a catalytic cathode within said cathode casing, wherein the cathode casing is in the form of a can having an open end and a closed end, and wherein said anode casing is in the form of a can comprising a body having an open end and a closed end and an inside surface and an outside surface, wherein the open end of the anode casing resides within the open end of the cathode casing with electrically insulating material between said anode and cathode casings and abutting at least a portion of said anode casing outside surface, wherein the anode casing has a circumventing peripheral edge surface at the open end thereof, wherein the anode casing comprises a triclاد of three different metals comprising stainless steel having a layer of nickel on its outside surface and a layer of copper on the inside surface of said stainless steel, said copper layer in contact with said zinc, wherein at least a portion of each of said three different metals are exposed at the peripheral edge surface of said anode casing, wherein said anode casing peripheral edge surface is plated with at least one layer of a protective metal comprising tin, thereby covering and preventing exposure of said different metals at said peripheral edge surface.

15. The zinc/air cell of claim 13 wherein said cell has a disk-like cylindrical shape of diameter between about 4 and 20 mm and a height between about 2 and 10 mm.

16. The zinc/air cell of claim 13 wherein said cell has a disk-like cylindrical shape of diameter between about 4 and 12 mm and a height between about 2 and 6 mm.

17. The zinc/air cell of claim 13 wherein said protective metal is applied to cover said anode casing peripheral edge after said anode casing has been formed into said can shape.

18. The zinc air cell of claim 13 wherein at least a portion of the outside surface of said anode casing is also plated with said protective metal.

19. The zinc/air cell of claim 13 wherein at least a portion of the outside surface of said anode casing abutting said insulating material is plated with said protective metal and said insulating material is in contact with said protective metal providing a seal therebetween.

20. The zinc/air cell of claim 13 wherein said protective metal plated on said anode casing peripheral edge surface eliminates the electrochemical potential gradient at the surface of said peripheral edge thereby reducing the chance of electrolyte seepage from the cell.

23. The zinc/air cell of claim 13 wherein said protective metal plated over said anode casing peripheral edge has a thickness of between about 0.0001 and 0.015 mm.

25. The zinc/air cell of claim 13 wherein said protective metal plated onto said anode casing peripheral edge is of homogeneous composition.

26. The zinc/air cell of claim 25 wherein said protective metal plated onto said anode casing peripheral edge has a uniform thickness.

28. The zinc/air cell of claim 19 wherein the protective metal plated on said portion of the outside surface of said anode casing abutting said insulating material has the same composition as the protective metal plated on the anode casing peripheral edge.

29. The zinc/air cell of claim 13 wherein said cathode casing has at least one hole in its surface to allow air to penetrate into the cell when the cell is in use.

30. The cell of claim 13 wherein the anode casing has a wall thickness between about 0.001 inches (0.0254 mm) and 0.015 inches (0.38 mm).

32. The cell of claim 13 wherein the nickel layer has a thickness of between about 0.0001 inches (0.00254 mm) and 0.001 inches (0.0254 mm).

33. The cell of claim 13 wherein said zinc particles comprises zinc alloyed with and alloy material comprising indium.

34. The cell of claim 33 wherein said alloy material comprises between about 100 and 1000 parts per million parts by weight based on pure zinc.

35. The cell of claim 13 wherein said zinc particles comprises zinc alloyed with an alloy material comprising indium, lead, and aluminum.

36. The cell of claim 35 wherein said alloy material comprises between about 100 and 2000 parts per million parts by weight based on pure zinc.

37. The cell of claim 13 wherein said cathode is a catalytic cathode comprising carbon and MnO_2 .

38. The cell of claim 13 wherein the anode material comprises less than about 100 parts mercury per million parts of zinc by weight.

39. The cell of claim 13 wherein the inside surface of the anode casing is also plated with said same protective material.

40. The cell of claim 19 wherein at least a portion of said closed end of the anode casing is exposed to the external environment and said exposed portion is also plated with said protective material.

48. A zinc/air depolarized cell comprising an anode casing and a cathode casing, an anode material comprising zinc and alkaline electrolyte within said anode casing, and a catalytic cathode within said cathode casing, wherein the cathode casing is in the form of a can having an open end and a closed end, and wherein said anode casing is in the form of a can comprising a body having an open end and a closed end and an inside surface and an outside surface, wherein the open end of the anode casing resides within the open end of the cathode casing with electrically insulating material between said anode and cathode casings and abutting at least a portion of said anode casing outside surface, wherein the anode casing has a circumventing peripheral edge surface at the open end thereof, wherein the anode casing comprises a triclاد of three different metals comprising stainless steel having a layer of nickel on its outside surface and a layer of copper on the inside surface of said stainless steel, said copper layer in contact with said

zinc, wherein at least a portion of each of said three different metals are exposed at the peripheral edge surface of said anode casing, wherein said anode casing peripheral edge surface is plated with at least one layer of a protective metal comprising copper, thereby covering and preventing exposure of different metals at said peripheral edge surface.